

**ABSTRACT OF THE INVENTION**

A method of forming a tantalum-nitride layer (204) for integrated circuit fabrication is disclosed. Alternating or co-reacting pulses of a tantalum containing precursor and a nitrogen containing precursor are provided to a chamber (100) to form layers (305, 307) of tantalum and nitrogen. The nitrogen precursor may be a plasma gas source. The resultant tantalum-nitride layer (204) may be used, for example, as a barrier layer. As barrier layers may be used with metal interconnect structures (206), at least one plasma anneal on the tantalum-nitride layer may be performed to reduce its resistivity and to improve film property.